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THE AMERICAN MATHEMATICAL MONTHLY.

Entered at the Post-office at Springfield, Missouri, as Second-class Mail Matter.

VOL. III.

APRIL, 1896.

No. 4.

BIOGRAPHY.

JOHN NEWTON LYLE.

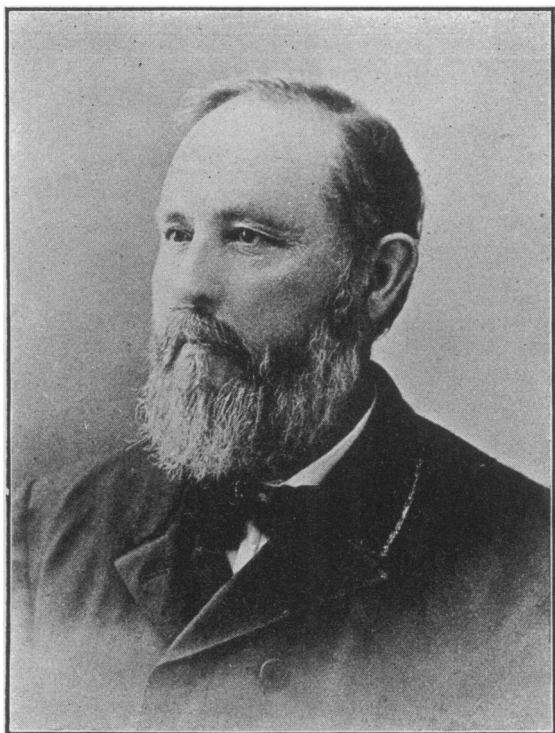
BY F. P. MATZ, SC. D., PH. D., PROFESSOR OF MATHEMATICS AND ASTRONOMY IN IRVING COLLEGE, MECHANICSBURG, PENNSYLVANIA.

 JOHN NEWTON LYLE was born in Ralls County, Missouri, March 5, 1836.

“The space in which this county is located is trinally extended, and therefore objective. It has no curvature, either positive or negative. Here planes are flat, and perpendiculars to a transversal are equidistant.

If Lobatschewsky had been born and raised in Ralls County, he would perhaps never have doubted *that two straight lines equidistant from each other may be drawn in the same plane*, nor written a theory of parallels in which this postulate of sound geometry is discredited. The hills, rocks, streams, trees, and hard-pan of Ralls County exist in tridimensional space,—objective to the minds of the inhabitants who till the soil, feed the herds, quarry the rock, fell the trees, and hunt the wild game. These physical objects are realities having an *objective* existence ; and the space occupied by them, and that in which they are contained, is also an objective *entity* although not a *material* one. It is believed that Helmholtz, was right in maintaining against Kant the objectivity of space, but wrong in regarding it as a *physical thing* to be moulded like potter's clay. Sir Isaac Newton held the opinion that space was immaterial, immovable, and unalterable, as well as trinally extended, continuous, and unbounded.

Immanuel Kant professed to cognize a real, objective, *extended* world as existing in a *space that*, according to his philosophy *had no existence outside of his own mind*. It would seem that if there is an extended world, there must be



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an extended spatial entity to contain it. If space is not *extended*, and therefore not objective, there can be no real, extended, objective, material world.

If Immanuel Kant's experiences in early life had been those of a pioneer's son in Ralls County, Missouri, he would not in all probability have undertaken in his riper years the contract of building a *real world* in a *non-existent* place.

If Fichte, or Hegel, had ever galloped after a wild steer for half a day through a Ralls County forest or been thrown from a bucking mustang on the phenomenal hard-pan of northeastern Missouri, they doubtless would not have felt inclined to regard this real matter-of-fact world as *an idealistic dream*."

The ancestors of John Newton Lyle, on the paternal side, came from northern Ireland ; and on the maternal side, from England and Wales. They settled in Berkeley County, Virginia, in the last century ; and many of their descendants are still to be found there.

Samuel Oldham Lyle, the father of the subject of this sketch, emigrated from Berkeley County, Virginia, in 1832, to Ralls County, Missouri, where he purchased a farm ; married, Ann Rebecca, the daughter of William Gerard, and reared his family. This pioneer couple were intellectual in their tastes, great readers, ambitious to make a pleasant home for their children, and give each of them an education.

Ann Rebecca's father, William Gerard, emigrated from Berkeley County, Virginia, to Kentucky, during the last decade of the last century, where he learned the printing business, and edited and published for many years the *Argus*, a newspaper, at Frankfort, Kentucky. He was a man of affairs, as well as of extensive reading ; and he was also a practical politician intimately associated with the statesmen of his adopted State. He came with his family to northeastern Missouri, in 1830.

John Newton Lyle, in his early boyhood, was thrown in his Grandfather Gerard's society a great deal, and received from him powerful impulses towards intellectual pursuits. The venerable man treated his grandson more as a companion than as a boy needing a rod for his misdemeanors, aroused his curiosity by well-directed questions, corrected his mistakes, and entertained him with anecdotes about Amos Kendall, the elder Blair, and Henry Clay.

Samuel Oldham Lyle was an enterprising, independent, and fearless pioneer, passionately fond of the chase and free life in the wild west ; but, at the same time, he was diligent in his farming and stock-raising. He was a man of quick intelligence, unfailing memory, and sound judgment, who appreciated the value and importance of education ; and he gave to his children the best school advantages that his circumstances would allow.

Young Lyle, at six years of age, was placed in a district school ; and here he remained until he reached the age of twelve. In November, 1848, he entered a classical school taught by the Rev. William T. Dickson, at West Ely, Marion County, three miles from the home of the young pupil. He studied the rudiments of the Latin and Greek languages, Euclid's Elements, and Day's Algebra.

Mr. Dickson was a native of the State of Maine, and came West with Dr.

Ezra Styles Ely, to attend Marion College, some time in the Thirties. "He was an enthusiastic and successful instructor in the branches of learning that he professed to teach. He did not tell his scholars anything about differential coefficients, integrals, or Cartesian co-ordinates. He was silent as to determinants, trilinears, and Non-Euclidean Geometry. He did understand Euclid's Elements, however ; and he taught the science, clearly, thoroughly, and ably. With him, straight lines were never *flexed* or *curved*. Tangents to circumferences were never confounded with the curves to which they were tangent. Planes were flat superficies ; and, in no instance, were they spherical or pseudo-spherical. He showed the *meaning* of demonstration, by *demonstrating* theorems. He illustrated by practical examples, the difference between direct and indirect proof. He was a true teacher, and succeeded well in imparting to his pupils something of his own appreciation and admiration of the enduring work of Alexandria's immortal geometer."

In the fall of 1851, within three miles of Samuel Oldham Lyle's farm, Van Rensselaer Academy was founded, at the head of which was the Rev. J. P. Finley, afterwards a professor in Westminster College, and the founder of a classical institution at Brookfield, Missouri. John Newton Lyle entered this Academy, in October, 1851 ; and he was a student there three successive winters, farming during the summer. Here he continued his studies in Latin and Greek, reviewed Euclid, then took up Davies' Legendre and Robinson's Algebra. At this time, he, also, studied Trigonometry and Surveying. Mr. Finley's tastes were classical, rather than mathematical ; and his pupil, J. N. Lyle, whilst at the Academy, devoted his energies almost exclusively to mastering the Latin and Greek texts put into his hands.

Before he was nineteen years of age he took charge of his first school in Monroe County, early in September, 1854 ; thus he began his long career as a teacher, which he has continued almost uninterruptedly until the present time. He worked with the definite plan of preparing for College and earning the funds necessary for securing a collegiate education. He taught two years in the public schools of Monroe County, spending his evenings and Saturdays in study.

During these years he plodded without assistance, through Davies' Analytical Geometry. Having finished this self-imposed task, a strong desire took possession of him to advance farther and investigate Davies' Differential and Integral Calculus. Accordingly one sultry day in August, 1856, he rode from his father's farm to Hannibal, purchased the book, and on returning home immediately sought a secluded spot in the forest and began the study of the first differential coefficient as explained by Charles Davies. He was *thoroughly disgusted* that hot August afternoon, with Davies' description of differentials as the "traces" of vanishing increments. He persevered, however, notwithstanding his dissatisfaction with the author's theory of differentials and differential coefficients. A copy of Loomis's Calculus, which came in his way, was eagerly studied. Loomis's theory of differentials as *rates of variation* had the advantage of being intelligible, and certainly offered something more substantial to be grasped by

the mind than a mere "trace" of a vanishing increment or the "ghost of a departed quantity."

"Rates of variation are *finite* quantities. If differentials are rates of variation, then, of necessity, they must be definite quantities. The Leibnitzian hypothesis that differentials are *infinitely small quantities* contradicts the hypothesis that they are rates of variation." During the fall of 1856, he studied both Loomis and Davies on the Calculus. This work was done entirely without the instruction of a teacher; because there was no one within reach, who had studied these branches, to whom he could apply for aid. "*This method of study, whilst laborious and beset with many inconveniences, was conducive to independence of thought and action, and the formation of the habit of self-reliance.*"

The first part of the year 1857, John Newton Lyle taught mathematics in Bethel College, a Baptist Institution located at Palmyra, Missouri. The opportunity of attending Marietta College, for which he had long planned and toiled, now presented itself. On examination he entered the Junior Class in Marietta College, the fall of 1857; and he continued in that Institution, until his graduation in 1859.

President Israel Ward Andrews conducted the examination in Mathematics, and expressed himself as highly gratified with the candidate's proficiency; and on making inquiry as to who taught him Analytical Geometry, seemed amused when informed that his only instructor was the youthful pedagogue before him seeking admittance to the privileges of the College. Dr. Andrews was his warm and steadfast friend, from the date of that morning's interview on Mathematics.

J. N. Lyle, in College, sought to utilize the advantages of the library and his literary society as well as those of the recitation-room and the laboratory. His special delight was to participate in the Saturday-morning debates held in the hall of the Alpha Kappa Society. The enjoyableness of the excitement far outweighed the unpleasantness of the collisions incident to such exercises.

He lost no time in obtaining from the College Library De Morgan's Differential and Integral Calculus, in order to learn that author's opinions respecting the principles of the science. "He was interested in noting that De Morgan employed variables that increased, and decreased, indefinitely without limit, instead of the hierarchy of infinitely great, and infinitely small, quantities of the Leibnitzian hypothesis. Whilst no lost value was attributed to these variables, every value that they did have, was *finite*. The hypothesis of increasing, and decreasing, variables having finite values not only works well in practice, but has the advantage over the hypothesis of Leibnitz in that it is intelligible and does not involve contradiction. It also harmonizes well with the view that differentials are rates of variation. Further, in considering a limit, we note that the interval between a limit and the variable that approaches it, is itself a variable that decreases without limit. From this point of view, the absurdity of regarding a variable that increases without limit as having a limit appropriately symbolized by ∞ , is quite evident.

No benefit accrues to the Science of the Calculus, from De Morgan's hypothesis that there are *two* kinds of zeros—the *absolute zero*, and the *indinitely small quotient*. The absolute zero is destitute of all value ; in fact, it is the negation of quantity,—and hence can not be treated as quantity, without violating the logical law of Non-Contradiction. A quotient may become indefinitely small, but can not become so small as not to be quantity. To name a quotient zero, is manifestly a misnomer. Mathematical and logical confusion is liable to result from the ambiguous use of the symbol 0. Treating quantity as no quantity, or no quantity as quantity, is a procedure which may be profitably dispensed with in Mathematics."

E. W. Evans, of Yale, came to Marietta College, as Professor of Mathematics, at the same time that J. N. Lyle entered as a student. The young professor seemed very lonesome as his wife remained in the East that fall. He would come over to Lyle's room of evenings and remain for hours. His conversation which took a wide range was quite instructive to his western pupil. Mathematics was discussed a great deal, but not exclusively. He believed most religiously that "brevity is the soul of wit." He once said : "Lyle, the longer I live the more I like 'short things'." His pupil furnished his share of the intellectual picnic with anecdotes and experiences respecting that portion of the West where Mark Twain was born, Tom Sawyer flourished, and Captain Sellers bored with a big auger.

The two years immediately after graduation he spent in teaching in Pettis and Morgan Counties, Missouri. His leisure hours were occupied in reading law-books. In the spring of 1862, he was offered the chair of Mathematics and Natural Science in Westminster College, a position he held until 1865, when he went to Carondelet, a suburb of St. Louis, where he taught a Grammar School ; but in the fall of the same year, he accepted the position of Acting Professor of Mathematics and Natural Science in his *Alma Mater*, Marietta College. He continued there three years ; at the expiration of which time, he returned to Fulton, as Professor of Natural Science in Westminster College. Here he has since remained. First and last, as the exigencies of College-work might require, he has taught branches in nearly every department of the Institution.

He is an active member of *The Missouri Teacher's Academy*. To educational journals he has contributed hundreds of articles principally on Mathematical Philosophy. During the last three years preceding 1890, he had published in the *Missouri School Journal* not less than sixty-one articles. He has written an unpublished manuscript on the Differential and Integral Calculus.

The degree of Ph. D., was conferred on him by Marietta College, in 1881. In 1868, Professor Lyle was married to Miss Margaret T. Hays, daughter of John B. Hays, M. D., of Marion County, Missouri, who until her death, December 26, 1882, in spite of ill health and great suffering, led such a life of unselfish devotion to husband, children, and friends, as called forth constant admiration of the talent, energy, and piety, that enabled her to accomplish so much. Three of the five children of this couple are living, two daughters and a son, Rev. Edward

Hays Lyle, an alumnus of Westminster College, a Theological student of Princeton Seminary for two years, and at present a minister in charge of a church at La Junta, Colorado.

Dr. Lyle, in 1884, married his second wife, Miss Mattie E. Grant, a scholarly and cultured lady, of Bardstown, Kentucky.

Dr. Lyle has been for many years an Elder in the Presbyterian Church, the church of his ancestors for, at least, the century and a half that have elapsed since his Great Grandfather emigrated from the northern part of Ireland to Berkeley County, Virginia.

THE CENTROID OF AREAS AND VOLUMES.

By G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.

[Concluded.]

We will now find the centroid of the eighth part of the surface

$$\left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 + \left(\frac{z}{c}\right)^2 = 1, \text{ I, when } c=b, \text{ II, } c=a.$$

$$\text{We have } \bar{x} = \frac{\int x ds}{\int ds}, \quad \bar{y} = \frac{\int y ds}{\int ds}, \quad \bar{z} = \frac{\int z ds}{\int ds}.$$

$$\begin{aligned} \text{I. } s &= \frac{b}{a} \int_0^a \int_0^{\frac{b}{a}\sqrt{a^2-x^2}} \left\{ \frac{a^4 - (a^2 - b^2)x^2}{a^2 b^2 - b^2 x^2 - a^2 y^2} \right\}^{\frac{1}{2}} dx dy \\ &= \frac{\pi b}{2a^2} \int_0^a \sqrt{a^4 - (a^2 - b^2)x^2} dx = \frac{1}{4} \pi b \left(b + \frac{a}{e} \sin^{-1} e \right). \end{aligned}$$

$$s.\bar{x} = \int x ds = \frac{b}{a} \int_0^a \int_0^{\frac{b}{a}\sqrt{a^2-x^2}} \left\{ \frac{a^4 - (a^2 - b^2)x^2}{a^2 b^2 - b^2 x^2 - a^2 y^2} \right\}^{\frac{1}{2}} x dx dy$$